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Applicant: LILLY INDUSTRIES LIMITED, Kingscote Road, Desborough North, RG21 2XA (GB)  
Inventor: Owen, Mervyn George, The Bases, Norfolk Road, Liverpool L25 5UN (GB)  
Inventor: Fuchs, Paul James, Flat 3, 53 Ansonville Road, West Kensington, London W14 6ET (GB)  
Inventor: Hayes-Paulkner, Richard Paul, 51 Cranborne Lane, London SW9 6LP (GB)  
Inventor: Murray, Alan Henry, 29 Devils Park, Liverpool L19 2LJ (GB)  
Inventor: Rubin, Avi Kanner, 18 Worthington Road, Surbiton, Surrey KT6 7DX (GB)  
Representative: Tupling, Kenneth George et al, Lilly Industries Limited, European Patent Operations, Ed Wood Manor, Windham Farm, GU20 6PH (GB)

Devices for dispensing and counting articles.

A device for dispensing articles comprises a container for articles, a housing for receiving the container comprising a storage region for articles, dispensing means operable to dispense an article from the storage region, operation of the dispensing means being arranged to move an article from a holding position to a dispensing position, means (30) responsive to operation of the dispensing means for counting the number of operations, the counting means (30) being operable only when an article is dispensed, and means for retaining removal of the container from the housing until all the articles have been dispensed.

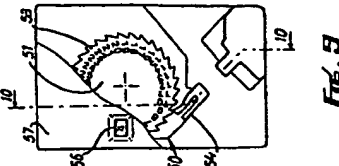


FIG. 1

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membrane from the outlet. The out membrane may be pushed into a recess in the container. The outlet may have four sides and the membrane extends beyond the sides of the outlet and the means out the membrane along and outside the sides and pushes the membrane along and outside the fourth side to move the out membrane into the recess.

- 1 A device according to the invention may have one or more of these features.
- 2 The invention may be performed in various ways and one specific embodiment with possible modifications will now be described by way of example with reference to the accompanying somewhat schematic drawings, in which:
  - 3 Fig. 1 is a perspective view of a first embodiment of an article dispensing device;
  - 4 Fig. 2 to 4 are part sections through this embodiment showing dispensing of an article;
  - 5 Fig. 5 is a section through the embodiment showing a modification;
  - 6 Fig. 6 is a section on the line 6-6 of Fig. 5;
  - 7 Fig. 7 is a section showing an unjamming mechanism;
  - 8 Fig. 8 is a section on the line 8-8 of Fig. 7;
  - 9 Fig. 9 is a section showing a counter mechanism;
  - 10 Fig. 10 is a section on the line 10-10 of Fig. 9;
  - 11 Figs. 11 to 13 are sections showing operation of an unjamming mechanism;
  - 14 Fig. 14 is a perspective view showing location of a hopper;
  - 15 Fig. 15 is an enlarged view of part of Fig. 14;
  - 16 Figs. 17, 18 show interaction between hopper and counter mechanism;
  - 17 Fig. 19 is a section through the hopper and counter mechanism;
  - 18 Fig. 20 A to D show another form of interaction between hopper and counter mechanism;
  - 19 Fig. 21 is a perspective illustration of hopper and counter;
  - 20 Figs. 22A to 22D show operation of a full counter;
  - 21 Fig. 23 is a perspective view of a device with lock and show operation of the lock;
  - 22 Fig. 24A to C is a perspective view of a second embodiment;
  - 23 Fig. 25 are part sections showing the dispensing components of the second embodiment;
  - 24 Fig. 26 is a section through the 25-26 of Fig. 25A;
  - 25 Fig. 27 is a perspective view of a counter mechanism;
  - 26 Fig. 28 is a section through line 28-28 of Fig. 27;
  - 27 Figs. 29 to 37 are sections showing operation of the unjamming mechanism;
  - 28 Fig. 38A to D show details of the hopper-retraction interaction between the hopper and counter wheel;
  - 29 Fig. 39 to 43 show details of a trigger lock.

In general a dispensing device for articles is arranged for use of one for example for the elderly, blind or handicapped and is arranged on each operation to dispense a single article. A counter may be arranged to indicate the number of articles dispensed or not yet dispensed. A replaceable hopper can be used to load the device. The device includes a store in which the articles are confined to a single phase, the store having an outlet passage adapted to receive articles in a desired orientation. When operated the article to be dispensed is moved from a holding or waiting position to a dispensing position. In a first embodiment the device 30 for dispensing articles, for example pills, tablets or capsules or other solid medicaments, comprises a housing 31 including a dispensing mechanism 32 and a hopper 33 for use in introducing into the device articles which are to be dispensed. As shown in Fig. 1, the device 30 is sized to be held in a hand. It includes a dispensing element 34 slidably mounted in the housing 31 and a zone 35 into which an article 36 is dispensed.

Inside the housing 31 is a storage region 37 which includes the hopper 33. A dispense outlet passage 38 leads from a lower end of the region 37 which, as seen in Fig. 2, is defined by walls 39, 39a which are inclined towards the passage 38. The region 37 has parallel walls 40, 41 spaced so as to confine the stored articles 36 to a single phase.

The dispensing element 34 includes an operating part 42 which in a datum position is located at a corner of the housing. Fig. 3 is in this position the next article 36a to be dispensed is located in a gap 43 between two portions 43, 44 of the dispensing element 34 and in engagement with a part 45 of the housing 31. When the user presses the operating part 42 against a suitable surface so as to move the element 34 upwards in the housing (Figs. 3, 4) the article 36a is moved laterally so that the article 36a can fall into the zone 35, during which movement a part 47 of the element 34 moves into a position closing the lower end of the passage 38 (Fig. 4). The element 34 includes an offset portion 48 at one side of the gap 43 and connecting the portions

This invention relates to devices for dispensing articles.

According to one aspect of the invention a device for dispensing articles comprises a store for articles, and dispensing means operable to dispense an article from the store, operation of the dispensing means being arranged to move an article from a holding position to a dispensing position.

The dispensing means may comprise first and second parts between which the article is received in the holding position, movement of the first and second parts moving the article to the dispensing position.

There may be a lost motion connection between the first and second parts so that dispensing movement of the first part only moves the second part when an article is in the holding position. There may be means for clamping articles in the store. The dispensing means may be operated by the dispensing means.

There may be a connection between the dispensing means and the dispensing means arranged to operate the dispensing means on operation of the dispensing means to dispense an article and on movement of the dispensing means to a position to receive the next article to be dispensed. The connection may comprise a rack and a toothed wheel.

The store may comprise a storage region with an outlet passage leading to the holding position and arranged to receive articles in a desired orientation. The dispensing means may comprise rotary means having elements extending into the store. The rotary means may have elements extending into the store which are adjacent an inlet to the outlet passage. The store region may comprise walls inclined towards the inlet, and the elements may be in the store region adjacent the walls.

The device may have a housing having a peripheral defining corner, and the dispensing means comprise an operating member at a corner. There may be security means operable between an operative position in which operation of the dispensing means is retained in an operative position in which operation of the dispensing means is permitted.

There may be means for releasably holding the security means in the operative position. There may be means for releasably holding the security means in the operative position. The device may comprise a housing, the security means comprising a member movably supported in the housing and may be acted to be held.

According to another aspect of the invention a device for dispensing articles comprises a store for articles, means operable to dispense an article from the store, and means responsive to operation of the dispensing means for counting the number of operations, the counting means being operable only when an article is dispensed. Operation of the dispensing means may move an article from a holding position to a dispensing position.

The dispensing means may comprise first and second parts between which an article to be dispensed is received in the holding position, and a lost motion connection between the first and second parts so that the second part moves with the first part only when an article is received between the first and second parts, the counting means being responsive to movement of the second part.

According to another aspect of the invention a device for dispensing articles comprises a container for articles, a housing for receiving the container, means associated with the housing and operable to dispense an article, and means for retaining removal of the container from the housing until all the articles have been dispensed. There may be means for retaining cooperating components of the housing and container responsive to receipt of the container by the housing. The cooperating means may comprise first and second formations on the container cooperable respectively with first and second formations in the housing, engagement of the first formation on receipt of the container moving the second housing formation to cooperate with the second container formation to resist removal of the container, operation of the dispensing means to dispense all the articles moving the second housing formation out of cooperation with the second container formation. The first container formation may be movable between an operative position in which the first container formation can cooperate with the first housing formation and an inoperative position, the first container formation being moved to the inoperative position by said engagement of the first formations. The first container formation may be carried by slidable means so as to be movable between the operative and inoperative positions. There may be eject means operable to eject the container from the housing when the retaining means is rendered inoperative on dispensing of all the articles. The eject means may comprise spring means energized by receipt of the container by the housing.

According to a further aspect of the invention a device for dispensing articles comprises a container for articles, a housing for receiving the container, means associated with the housing and operable to dispense an article, the container having an outlet, a closure for the outlet, the housing and container having cooperating means which open the outlet on receipt of the container by the housing. The closure may be a flexible membrane connected to a member, which member on insertion of the container into the housing engages with the housing to draw the membrane from the outlet. The closure may be a flexible membrane, and the housing comprises means operable on insertion of the container into the housing to cut the membrane and to move the out

43, 44.

The element 34 is biased to the datum position by a spring 120 (omitted from some figures) which when the element 34 is no longer pressed upwards urges the element back to the datum position and the article 36a at the lower end of passage 38 moves into the gap 43 so as to be ready for dispensing on the next operation of part 42.

It is desirable to include in the device 30 a counter or indicator mechanism 60 to provide an indication of how many articles have been dispensed from an initial number in the storage region 37 or how many remain in the device 37. For this purpose, a wheel 51 is mounted in the housing 31 for rotation on axle 52 and has a cammed peripheral track 53 cooperable with an element 54 connected to portion 43 and slidably guided in the housing 31 so that on each upward movement of the part 42 the wheel 51 is turned one tooth. A window 56 in a wall 57 of the housing 31 displays either the number of articles dispensed or the number remaining in region 37. The number of teeth 53 corresponds to the number of articles initially in the region 37.

If the part 42 is operated when the region 37 is empty of articles, it is undesirable for the counter mechanism to be operated. A lost motion connection is therefore provided between portions 43, 44. The portion 48 is omitted and element 34 includes a recess 55 in which is slidable tongue 59 extending from portion 43 and including lip 59a. In the datum position the lip 59a is at the upper end of the recess 55 and if an article 36a is in the gap 45 dispensing occurs because the article 36a establishes a connection between portions 43, 44, if the gap 45 is empty then on upward movement of the part 42 and portion 44, the portion 43 does not move upwards. One means by which gap 45 may be empty is if the articles 36 in the lower part of region 37 are lifted or jammed so as not to pass in succession into the passage 38; an example is shown in Fig. 12. An article displacing mechanism 60 is provided in the housing 31 and includes two wheels 61, 62 rotatably mounted in the housing 31. The wheels 61, 62 have cooperable toothed peripheral portions 61a, 62a. Wheel 62 has a central toothed cog 63 which cooperates with a toothed rack 64 on an extension 65 of the part 42 which is slidably guided on housing 31.

The wheels 61, 62 carry a plurality of equidistantly spaced pins 66. In the case shown three, extending parallel to the axis of rotation adjacent the wheel peripheries. On operation of part 42 the wheels 61, 62 are rotated in opposite senses end-on or more pins 66 are moved in the storage region 37 inwards of surfaces 39, 39a to disturb the articles 36 (Fig. 13) and allow an article 36a to move into the gap 43. The rack 64 and cog 63 have a heavy ratchet connection so that the cog 63 is turned only on upward movement of part 42. Other means for which this disturbance could be provided.

The hopper 33 is pushed fully into the housing 31 so that after insertion the hopper 33 cannot readily be tampered with, and the hopper is constructed so that tampering before insertion can be detected. Thus the flat hopper has opposed walls 67, 68 which slidably engage housing walls 40, 41, a top wall 69 and side walls 70, 71. Wall 71 is inclined towards wall 70 at corner part 71a so as to direct the articles towards an outlet 72. The outlet 72, below the hopper is formed into the housing 31, is closed by a pad-off top 73 which extends the further along wall 70 and is attached to a boss 74. When the hopper is pushed into the top end of the housing 31, the boss 74 locates in a recess 75 adjacent the housing top and part further movement of the hopper causes the top 73 to pad away from the outlet 72, see Figs. 14 A-C, allowing articles to move from the hopper into the lower end of region 37, the hopper occupying the upper end.

Prior to the lower face 40a of housing wall 40 has a bayonet 77 cooperable with a boss 78 on wall 70. If the boss 78 is not in the correct position the hopper cannot be inserted into the housing. Also, the hopper 31 may have a normally depressible tongue 79 which when pressed can enter a bayonet 80 on the lower face 40a. Means are provided to eject or part eject the hopper 33 from the housing 31 when all the articles have been dispensed. An extension, the number of teeth on the counter mechanism wheel 51 would correspond to the number of articles in the hopper before insertion into the housing. The boss 78 on insertion of the hopper passes through a gap 81 (Fig. 17) in a ring 82 attached to the counter wheel 51. A plunger 83 extends an movable arm 84 engaging a boss 85 on the ring 82 and the ring extends to a pin 86 (Fig. 18) to block upward movement of the hopper which then cannot be reinserted until the complement of articles has been dispensed and the gap 81 (Fig. 17) is again above the boss 78. Each arm 84 has a flexible part 84a and can rotate at an end and is support 84b and is constructed to operate as an over-center mechanism with upper (Fig. 18) and lower (Fig. 18, 17) stable positions. Insertion of the hopper moves arm 84 upwards to an upper of its stable states under the engagement of parts 82, 83.

A spring 86 engages between the hopper and the housing and is compressed by insertion of the hopper so that when the top 73 is again above the boss 78 the spring 86 moves the hopper upwards, the boss 78 passing through the gap 81. After the hopper has been inserted by 81 on an arm 84 may cooperate with boss 78 passing through the gap 81. After the hopper has been inserted by 81 on an arm 84 may cooperate with boss 78 in the housing 31. Because the arm 84 is now in the upper stable position, if the hopper were re-inserted into the housing the plunger 83 would act engage the boss 85 and the spring 86 would again urge the hopper upwards.

In a modified arrangement, Figs. 19A-D, a structure 87 is attached to the hopper and includes U-shaped element 87a having arms 88, 89. Arm 88 can be used at junction 90 between arms 88, 89. When the hopper is inserted into the housing, arm 88 moves slightly towards arm 89 and they pass through gap 81 and arm 88 then moves away from arm 89 (Fig. 19B) so that the hopper cannot be removed because of engagement with the ring 82. As the ring is rotated step by step during use, it pivots 90 counter to the initial position the arms 88, 89 can pass through the gap 81 enabling the spring 85 to eject the hopper. If the hopper is re-inserted it will again be ejected. The arms 88, 89 form a structure with two stable positions (Figs. 19A, Fig. 19D).

In the arrangement of Figs. 20A-D the hopper 33 has an aperture 98 in which a projecting latch 99 can slide. When the hopper is inserted the latch 99 at one end of the aperture engages a shoulder 97 at one end of a cam surface 98 on the ring 82 to move the ring 82 to a hopper-releasing position (Fig. 20B). As the wheel 81 is rotated in use, the latch 99 engages the cam surface 98 and is moved to the other end of the aperture 98 where the device 30 is empty, at which stage the spring 85 ejects the hopper. If the empty hopper is reinserted the latch 99 does not engage shoulder 97 and the hopper is again ejected. The latch 99 thus has two operating positions at the ends of the aperture.

Figs. 21, 22A-D show another means for operating a hopper with its outlet face closed by a sealed metal cap 100. The outlet of the hopper is formed by walls 101 surrounded by a channel 102, situated in the housing in a generally rectangular device 103 open at its ends and having walls 104, 105, 106, 107. The upper edges of walls 104, 105, 106 are formed as cutters which cut the foil as the hopper is inserted.

The edge of wall 107 is convex and this pushes the foil which has been cut on three sides into one side of the channel (Fig. 22D). When the hopper has been inserted, the walls 104-107 are in the channel 102.

Preferably the device 30 is provided with a means of resistance to unaided use, or child proofing. As shown in Fig. 23, one side of the housing 31 is provided with a trigger-the portion 110 placed at one end and 111 set against the housing 31. A resilient locking member 112 is attached to project through an aperture 113 in wall 40. The member 112 is provided with a tab 114 which prevents movement of the member 112 in the aperture 113. A latch shown schematically at 115 connects the trigger 110 and the part 42 so that if the trigger 110 is in the down, unsequenced condition the part 42 cannot be operated to dispense an article. If the tab 114 is removed by pulling off, the member 112 can move in the aperture 113. The trigger is provided with two spaced notches 116, 117.

When the tab 114 is removed and the member 112 at the lower end of aperture 113, the trigger 110 can be squeezed to release the latch 115 and the part 42 can be operated (Fig. 24A). The requirement to squeeze the trigger 110 provides a degree of child proofing.

If the trigger 110 is in the unsequenced state and the member 112 is moved into notch 116 (Fig. 24B), the part 42 cannot be operated. If the trigger is squeezed and the member 112 is moved into notch 117 to hold the trigger in sequenced condition (Fig. 24C), the part 42 can be operated and the child proofing is removed. This would be for users who through age or infirmity are unable to, or unable reliably to, squeeze the trigger 110.

It will be noted that the operating part 42 is at a corner of the housing 31, so that the housing 31 can be used on any side without operating the part 42.

The suitable parts are protected by walls in the housing some of which are omitted for clarity.

The zone 30 may have transparent walls so that a dispensed article can be seen, and have one or more apertures 32a (Fig. 4) through which the dispensed article can be removed through an aperture 36A by manipulating the device 30, for example the article can fall onto a plate or pass direct into a user's mouth.

If desired the article rest zone 33 could be omitted and the article fall direct from the device 30. The position of lay and layway 76, 77 is different for different hoppers so that each housing will cooperate only with hoppers with the correct lay 76. Hoppers with different lays 76 are loaded with different articles 36. A user with a particular housing 31 can only receive articles appropriate to a housing having the relevant lay 76.

There could be a spring to assist in dispensing the article 36 (Fig. 4). A second embodiment is illustrated in Figs. 25-40. Components having functions similar to those of the first embodiment retain the same label number.

A device 30 comprises a housing 31 including a dispensing mechanism 32 and a hopper 33 for use in introducing into the device articles which are to be dispensed. In this embodiment, the dispensing zone 30 is located within the housing element 34, which is slightly recessed in the housing 31.

Inside the housing 31 is a storage region 37 which receives the hopper 33, as in the first embodiment. A dispensing outlet passage 38 leads from a lower end of the region 37, as seen in Fig. 26, is flanked by walls 39, 39a which are inclined towards the passage 38. The region 37 has parallel walls 40, 41 spaced so as to confine the stored articles 36 to a single plane.

The dispensing element 34 is located at the base of the housing, Fig. 26. When the user presses the device

downwardly on a surface this element retracts into the housing. A shuttle 123 located in a channel in one wall of the housing is moved to the position shown in Fig. 26 by shuttle driver 124, having a follower 125 which fits into a groove 126 in an upstanding wall 63 of element 34 (see Figs. 31A-D and 32). Article 36a drops into position in the gap 43 between shuttle 123 and a free shuttle 122, which is urged to its position in Fig. 29 by a light spring (not shown), when the device is reloaded, element 34 is returned to its starting position by means of a spring (not shown).

The shuttle driver 124 returns shuttle 123 to its starting position (Fig. 29). If the article 36a has successfully taken to its position in Fig. 27, the article is urged into contact with the free shuttle 122 and moved laterally to the delivery position in Fig. 28. A final slight retraction of shuttle 123 caused by the contact tip end of groove 126 allows the article to drop through the dispensing zone into the dispensing element 34, from which it can be tipped into the user's hand or mouth, or into another receptacle.

If article 36a became trapped in the position shown in Fig. 28B, then spring 120 would compress and prevent article 36a from being trapped.

The counting mechanism in this embodiment is shown in Fig. 33. Element 54 has a hole 76 which engages a peg on the back of free shuttle 122, this peg projecting through a slot in the housing wall. When the device is operated and an article 36a is successfully delivered, the element 54 is moved to the right (Fig. 33), and a ratchet arm on element 54 engages ratchet teeth 53 on counter wheel 51. Wheel 51 comprises a ratchet mechanism to prevent reversal of counter wheel 51 when the device is next operated and element 54 is moved to the left. If no article 36 is dispensed, either because no article falls into place or because of jamming, then shuttle 122 does not move and the counter wheel is not advanced. The number of articles dispensed is viewed through a window 58 in housing 57.

The means to prevent jamming or jamming in this embodiment is shown in Figs. 35-37. The upstanding wall of element 34 terminates in two parallel racks 64 having ratchet teeth. These co-operate with inclined wheels 63 which extend through the wall of the housing to slide wheels 61, 62 having bevels 66 which are rotated in the directions indicated when the device is actuated, displacing the articles in a generally upward direction. Reversal of rotation is prevented by fingers 67 (Fig. 35) provided in the housing wall. The bevels are set in shallow wells in one wall of the housing, the geometry being such that it is impossible to trap an article between a bevel and the side of the housing.

In this embodiment, rotation of the hopper is effected as shown in Figs. 38A-D. When hopper 33 is inserted into the housing base 78 passes through gap 81. A bi-stable member 98 mounted on 99 rotated when the lever 121 on the hopper engages shoulder 97 of the counter wheel 51 to rotate it so that base 78 is trapped while ring 82. As counter wheel 51 is rotated in use, gap 98 is moved by cam surface 89 to its second stable position. The hopper is ejected by a spring when counter wheel 51 has completed its rotation and base 78 is again aligned with gap 81. On re-insertion of the hopper with gap 81 in this second position, no contact with shoulder 97 would occur, and counter wheel 51 would not be rotated into the position where base 78 is trapped. The hopper would therefore be immediately ejected.

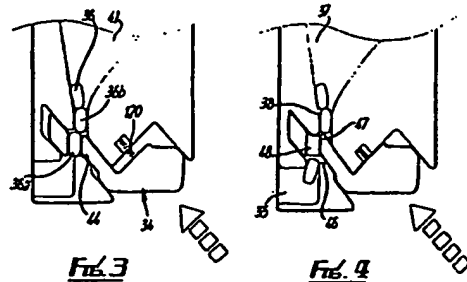
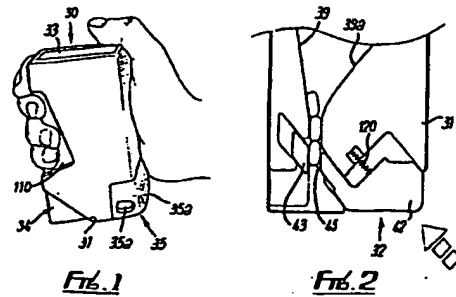
As in the first embodiment, the trigger device 110 (Fig. 39) must be depressed before the dispensing mechanism can be activated. In this embodiment, the locking mechanism comprises a slidable locking member 112 (Fig. 39) which can engage notch 116 to prevent activation and provide a degree of child-proofing (Fig. 40B). For reasons (being in a slightly different position) the trigger can alternatively be locked into its operating position by engaging member 112 with notch 117, as in Fig. 40C.

Claims

1. A device for dispensing articles comprising:
  - i) a container for articles,
  - ii) a housing for receiving the container comprising a storage region for articles,
  - iii) dispensing means operable to dispense an article from the storage region, operation of the dispensing means being arranged to move an article from a holding position to a dispensing position,
  - iv) means responsive to operation of the dispensing means for counting the number of operations of the counting means being operable only when an article is dispensed, and
  - v) means for readying removal of the container from the housing until all the articles have been dispensed.
2. A device as claimed in Claim 1, in which the dispensing means comprises a first and second parts between which the article is received in the holding position, movement of the first and second parts moving the article to the dispensing position, and including a lost motion connection between the first and second

parts so that dispensing movement of the first part only moves the second part when an article is in the holding position.

3. A device as claimed in Claim 1, in which the storage region has an outlet passage leading to the holding position, the outlet passage being arranged to receive articles in a desired orientation.
4. A device as claimed in Claim 1, comprising means operated by operation of the dispensing means for disturbing articles in the storage region, the disturbing means comprising rotary covers having elements extending into the storage region adjacent an inlet to the outlet passage.
5. A device as claimed in Claim 1, including security means movable between an inoperative position in which operation of the dispensing means is restricted to an operative position in which operation of the dispensing means is permitted.
6. A device as claimed in Claim 1, including means for releasably holding the security means in the inoperative position or in the operative position.
7. A device as claimed in Claim 1, in which the dispensing means comprises first and second parts between which an article is to be dispensed in the holding position, and a lost motion connection between the first and second parts so that the second part moves with the first part only when an article is received between the first and second parts, the counting means being responsive to movement of the second part.
8. A device as claimed in Claim 1, in which the means for readying removal comprises cooperative means of the housing and container responsive to receipt of the container by the housing, wherein first and second formations on the container cooperate respectively with first and second formations in the housing, engagement of the first formations on receipt of the container moving the second housing formation to cooperate with the second container formation to ready removal of the container, operation of the dispensing means to dispense all the articles moving the second housing formation out of cooperation with the second container formation.
9. A device as claimed in Claim 8, in which the first container formation is carried by bi-stable means so as to be movable between an operative position in which the first container formation can cooperate with the first housing formation and an inoperative position, the first container formation being moved to the inoperative position prior to removal of the container from the housing.
10. A device as claimed in Claim 8, comprising eject means operable to eject the container from the housing when the readying means is rendered ineffective on dispensing of all the articles.
11. A device as claimed in Claim 8, in which the eject means comprises spring means energized by receipt of the container by the housing.
12. A device as claimed in Claim 1 wherein the container for articles has an outlet, a closure for the outlet, the housing and container having cooperative means which open the outlet on receipt of the container by the housing.
13. A device as claimed in Claim 12 in which the closure is a flexible membrane, and the housing comprises means operable on insertion of the container into the housing to cut the membrane and to move the cut membrane from the outlet, the cut membrane being pushed into a recess in the container.
14. A device as claimed in Claim 13, in which the outlet has four sides and the membrane extends beyond the sides of the outlet and the means cut the membrane along and outside three sides and push the membrane along and outside the fourth side to move the cut membrane into the recess.



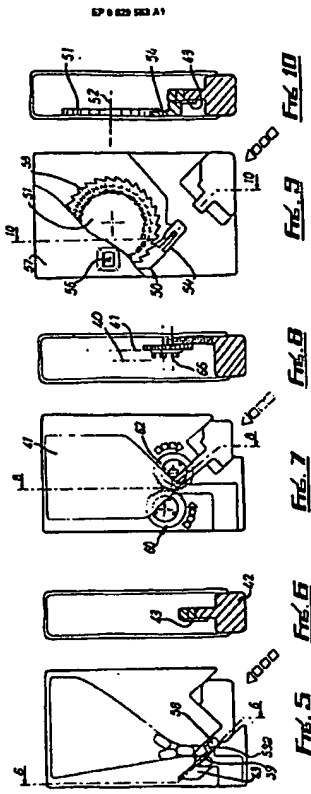


FIG. 10

FIG. 9

FIG. 8

FIG. 7

FIG. 6

FIG. 5

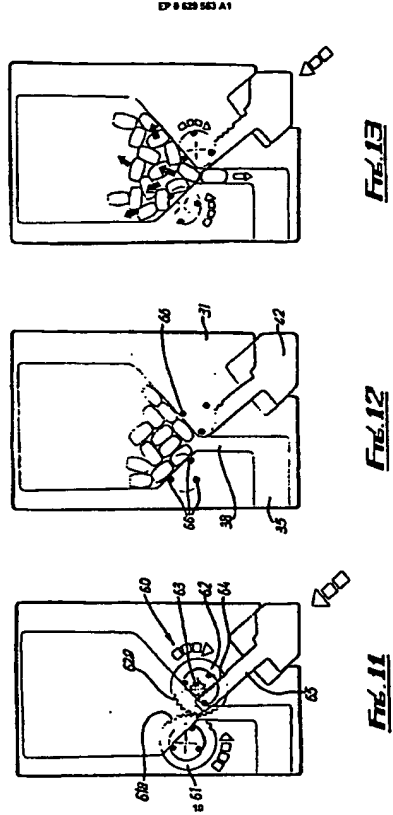


FIG. 13

FIG. 12

FIG. 11

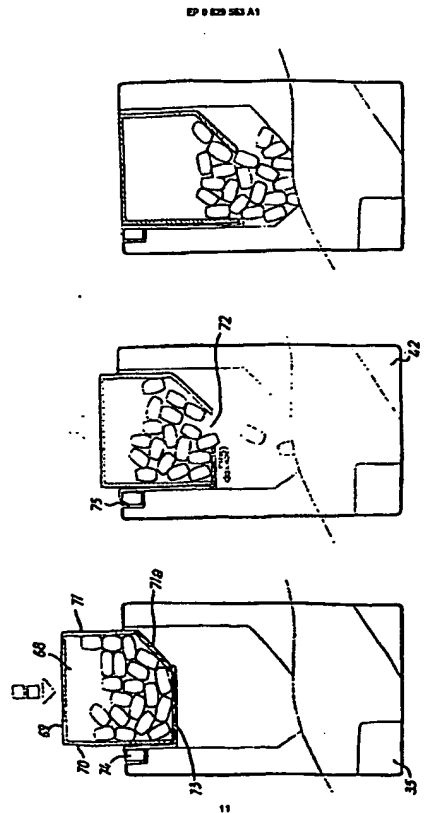


FIG. 19C

FIG. 19B

FIG. 19A

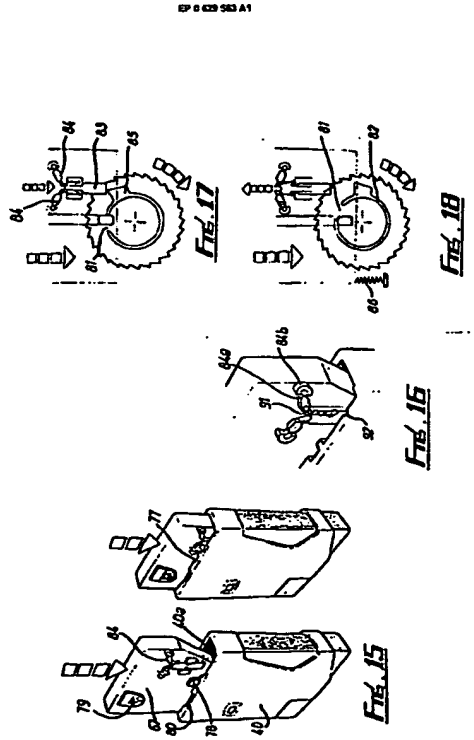


FIG. 15

FIG. 16

FIG. 17

FIG. 18

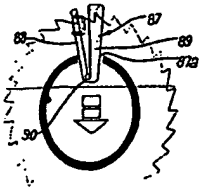


Fig. 19A

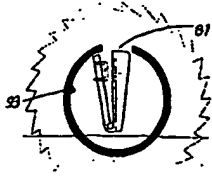


Fig. 19B

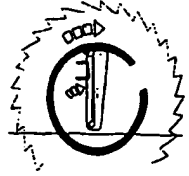


Fig. 19C

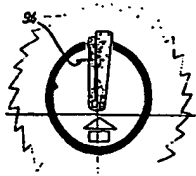


Fig. 19D

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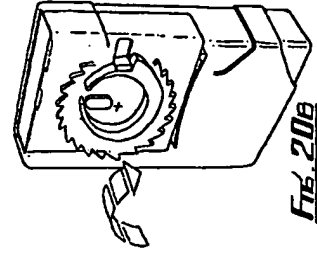


Fig. 20B

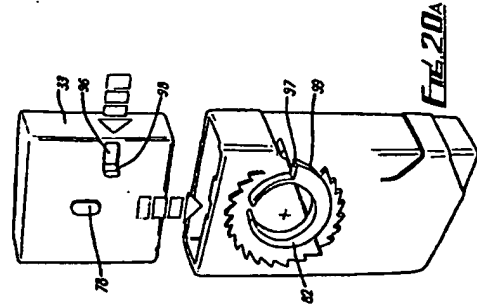


Fig. 20A

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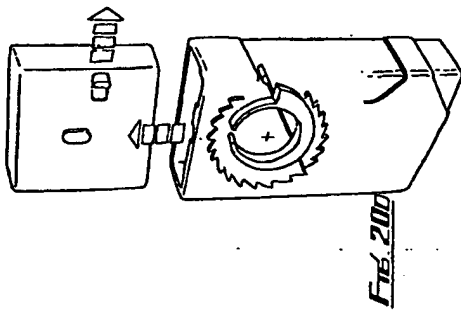


Fig. 20C

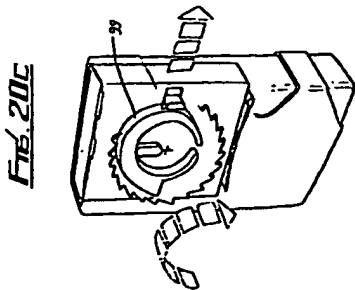


Fig. 20D

15

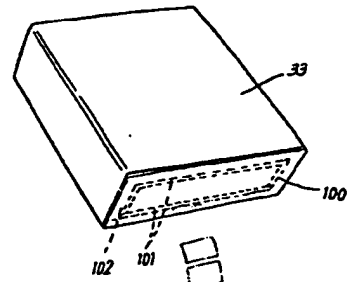


Fig. 21

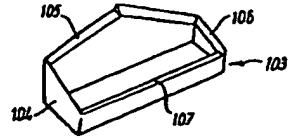


Fig. 21

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FIG. 22A

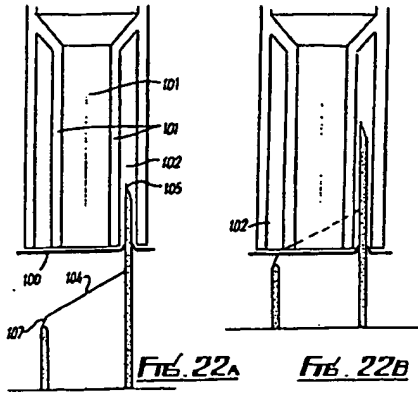


FIG. 22A FIG. 22B

FIG. 22C

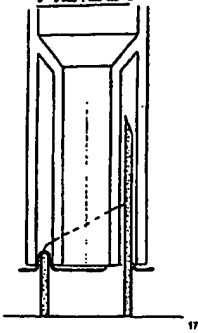
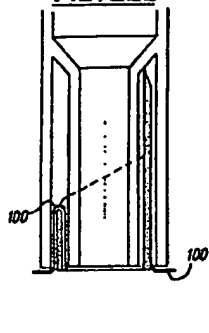


FIG. 22D



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FIG. 23

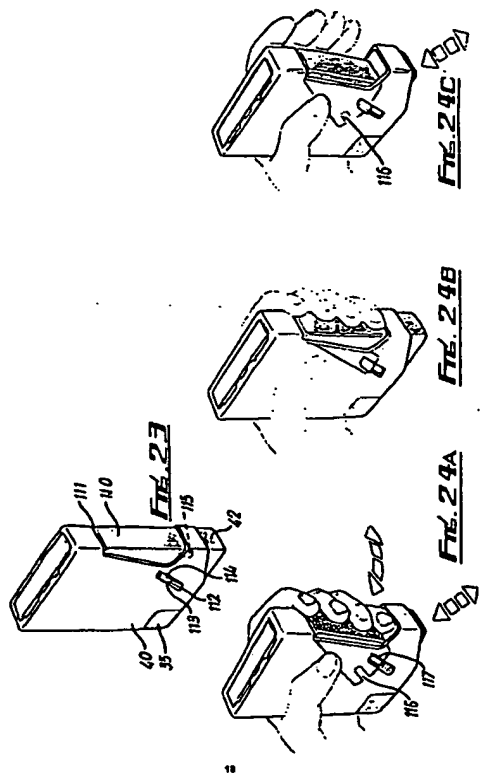


FIG. 23

FIG. 23A

FIG. 23B

FIG. 23C

FIG. 23D

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FIG. 24A

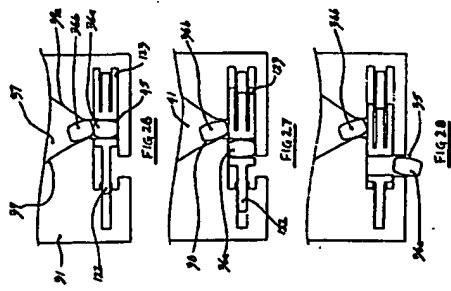


FIG. 24A

FIG. 24B

FIG. 24C

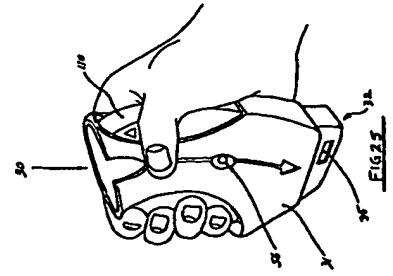


FIG. 24D

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FIG. 29A

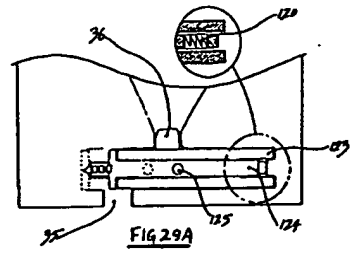


FIG. 29A

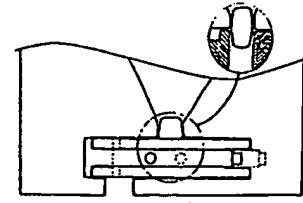


FIG. 29B

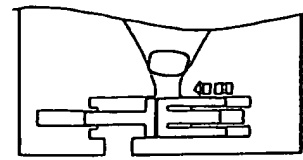
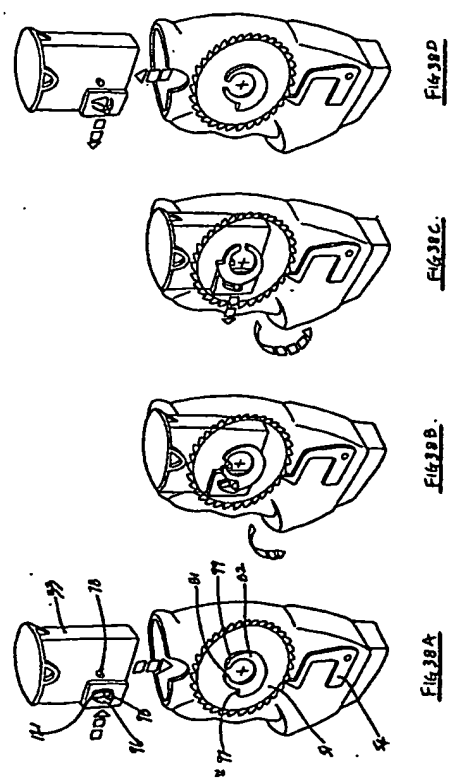
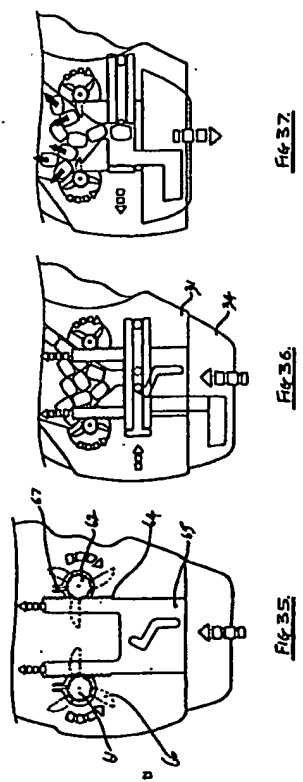
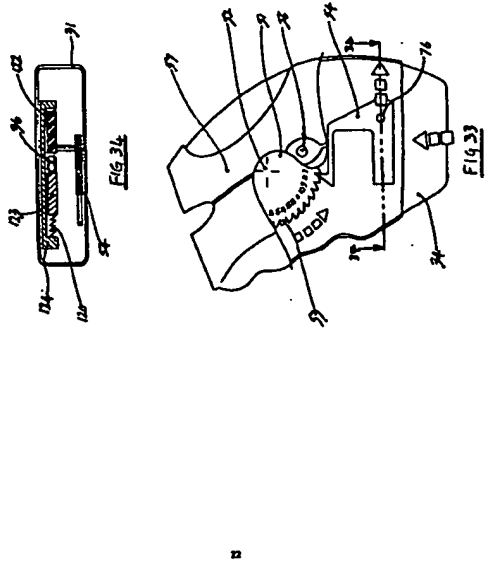
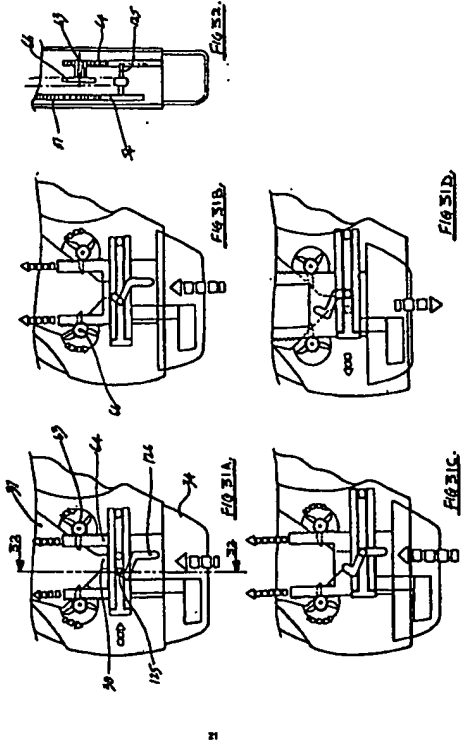


FIG. 30

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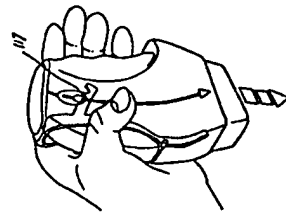


Fig 40C



Fig 40D



Fig 40A

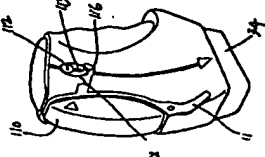


Fig 39



European Patent Office

EUROPEAN SEARCH REPORT

Application Number  
EP 94 30 4229

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Criteria of relevance (with references, where appropriate, to relevant passages)	Relevance to claims	Classification of the documents (IPC Class)
A	FR-A-712 676 (ETABLISSEMENTS HUYTS FRERES) " the whole document "	1	B60K/04 A61J/02
A	US-A-3 829 972 (LEHIS BENDER) " column 4, line 10 - column 6, line 61; figure 2 "	1	
A	GB-A-2 013 636 (THE EGOTS COMPANY LIMITED)		
The present search report has been drawn up for all claims			
Search Office BERLIN		Date of completion of the search 8 September 1994	Name of the Search Authority Deutsches Patent- und Markenamt
CATEGORY OF CITED DOCUMENTS 1: prior art documents 2: documents cited in the application 3: documents cited in the application 4: documents cited in the application 5: documents cited in the application 6: documents cited in the application 7: documents cited in the application 8: documents cited in the application 9: documents cited in the application 10: documents cited in the application 11: documents cited in the application 12: documents cited in the application 13: documents cited in the application 14: documents cited in the application 15: documents cited in the application 16: documents cited in the application 17: documents cited in the application 18: documents cited in the application 19: documents cited in the application 20: documents cited in the application 21: documents cited in the application 22: documents cited in the application 23: documents cited in the application 24: documents cited in the application 25: documents cited in the application 26: documents cited in the application 27: documents cited in the application 28: documents cited in the application 29: documents cited in the application 30: documents cited in the application 31: documents cited in the application 32: documents cited in the application 33: documents cited in the application 34: documents cited in the application 35: documents cited in the application 36: documents cited in the application 37: documents cited in the application 38: documents cited in the application 39: documents cited in the application 40: documents cited in the application 41: documents cited in the application 42: documents cited in the application 43: documents cited in the application 44: documents cited in the application 45: documents cited in the application 46: documents cited in the application 47: documents cited in the application 48: documents cited in the application 49: documents cited in the application 50: documents cited in the application 51: documents cited in the application 52: documents cited in the application 53: documents cited in the application 54: documents cited in the application 55: documents cited in the application 56: documents cited in the application 57: documents cited in the application 58: documents cited in the application 59: documents cited in the application 60: documents cited in the application 61: documents cited in the application 62: documents cited in the application 63: documents cited in the application 64: documents cited in the application 65: documents cited in the application 66: documents cited in the application 67: documents cited in the application 68: documents cited in the application 69: documents cited in the application 70: documents cited in the application 71: documents cited in the application 72: documents cited in the application 73: documents cited in the application 74: documents cited in the application 75: documents cited in the application 76: documents cited in the application 77: documents cited in the application 78: documents cited in the application 79: documents cited in the application 80: documents cited in the application 81: documents cited in the application 82: documents cited in the application 83: documents cited in the application 84: documents cited in the application 85: documents cited in the application 86: documents cited in the application 87: documents cited in the application 88: documents cited in the application 89: documents cited in the application 90: documents cited in the application 91: documents cited in the application 92: documents cited in the application 93: documents cited in the application 94: documents cited in the application 95: documents cited in the application 96: documents cited in the application 97: documents cited in the application 98: documents cited in the application 99: documents cited in the application 100: documents cited in the application			